PHOTOGRAPHING THE CORONA WITHOUT AN ECLIPSE.

Perhaps the most important observation since the discovery by Jannsen and Lockyer that the solar chromosphere could be studied without an eclipse, has recently been made by Mr. Huggins,[1] the well-known English astronomer.

When the spectroscope had been found capable of bringing this important region into daily view, there still remained the corona, whose feeble light and nearly continuous spectrum defied all attempts to see it through the overpowering glare of our own atmosphere; which, even in the purest sky, acts as a luminous veil between us and the object. It is very easy at all times to cut off the sun's direct light by a screen: unless the screen be at an enormous distance from the eye, however, this glare is not diminished by its use. Mr. Huggins's method is founded principally on two considerations.

The first is, that the principal coronal radiation (as found in Egypt by Dr. Schuster in the late eclipse) occupies a narrow part of the spectrum between G and H, while the atmospheric glare consists of light of all refrangibilities. As this coronal radiation, though occupying narrow limits of wave-length, is not monochromatic in the sense in which that of the chromosphere is, he has not employed the prism to disperse the atmospheric glare, but certain absorbent media to shut it out; choosing those, of course, most transparent to this violet light alone. The best isolating medium has been thus far found to be potassic permanganate.

The second consideration is, that since the G—H region is near the limit of vision, where, though the retina responds but feebly, the photographic plate is active; and since the latter is sensitive to feeble distinctions of light, and preserves a permanent record of them, it is best to use it, rather than the eye. Dr. Huggins has worked with a Newtonian telescope having a mirror of six inches aperture and three and one-half feet focus. By selecting fine days, he has obtained, between last June and September, twenty plates, showing what appear to be the rays and streamers of the sun's inner corona.

As at least one European observer of distinction deceived himself by the supposition that he had obtained a naked-eye view of the corona without an eclipse, and as the appearances about the sun caused by inequalities in our own atmosphere are most perplexing, and so corona-like as almost to 'deceive the very elect,' the reader will be interested in perusing the following letter to Mr. Huggins from Captain Abney, the eminent photographer: —

"A careful examination of your series of sun-photographs, taken with absorbing media, convinces me that your claim to having secured photographs of the corona with an uneclipsed sun is fully established. A comparison of your photographs with those obtained during the eclipse which took place in May last shows not only that the general features are the same, but also that details, such as rifts and streamers, have the same position and form. If in your case the coronal appearances be due to instrumental causes, I take it that the eclipse photographs are equally untrustworthy, and that my lens and your reflector have the same optical defects. I think that evidence by means of photography, of the existence of a corona at all, is as clearly shown in the one case as in the other."

This is a clear opinion from a master of the subject; but Dr. Huggins's own caution in statement, as well as skill in research, are, without it, sufficient to predispose us to believe, that, in spite of its difficulties, the problem of securing the forms of the inner corona without an eclipse has been, in principle, solved. What these difficulties are, only those few who have experimented in this particular direction know. As one of this number, the writer can only express his sense of the great consequence of the result reached, and his admiration of the skill employed in obtaining it. It is given to few to crown such a scientific life as that of Dr. Huggins, by a discovery of such importance.

S. P. Langley.

[1] On a method of photographing the solar corona without an eclipse. Paper read at the Royal society by William Huggins, D.C.L., LL.D., F.R.S., Dec. 21.

A SINGULAR METEORIC PHENOMENON.

We are indebted to the favor of the Bureau of Navigation, for the privilege of publishing the following very interesting letter of Captain Belknap, addressed to Commodore John G. Walker, United-States Navy, Chief of Bureau of Navigation, Navy Department, Washington.

U. S. S. Alaska, at Sea,
lat. 37° 54′ N., long. 124° 25′ W.
Dec. 15, 1882.

Sir, — I beg to report, that on the evening of the 12th inst., a few minutes after sunset, and in lat. 38° 21′ N., long. 134° 07′ W., a remarkable phenomenon was witnessed in the western horizon from the deck of this ship.

The sun had set clear, leaving the lower sky streaked with gorgeous tints of green and red, while the new moon, three days old, gave out a peculiar red light of singular brilliancy. Suddenly, at three minutes before five o'clock, a loud rushing noise was heard, like that of a large rocket descending from the zenith with immense force and velocity. It was a meteor, of course; and when within some 10° of the horizon it exploded with great noise and flame, the glowing fragments streaming down into the sea like huge sparks and sprays of fire.

FIG. 1. — Directly after explosion.

Then came the most wonderful part of the phenomenon; for, at the point in the heavens where the meteor burst, there appeared a figure like the shape of an immense distaff, all aglow with a bluish-white light of the most intense brilliancy. It kept that form for perhaps two minutes, when it began to lengthen upwards, and grow wavy and zigzag in outline from the action of the wind, and gradually diminishing in breadth, until it became a fine, faint spiral line, at its upper end dissolving into the fast-gathering clouds the meteor seemed to have evoked. It so remained, a gorgeous scroll of light, emblazoning an arc of some 15° or 20° in the heavens, and with all its vividness and brilliancy of coloring, for ten minutes longer, when it began to fade, and finally disappeared at eleven minutes past five o'clock, apparent time. So grand and startling had been the effect produced, that it might have been likened to a thunderbolt and its trail indelibly engraved upon the sky. All on board gathered on deck to look at the wonderful phenomenon, and all said they had never seen so marvellous a sight before. Had the meteor struck the ship, it would doubtless have been the last of the Alaska, and no vestige would have been left to tell the tale of her loss.

FIG. 2. — From 2 to 3 minutes after explosion.

And to those who witnessed this strange and unwonted manifestation of the forces of the universe comes the suggestion of possible unthought-of cause of sometime disasters at sea.

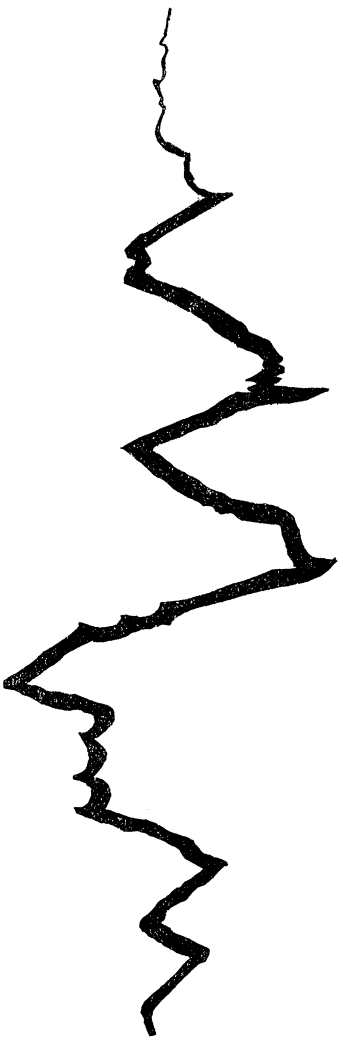

FIG. 3. — At 5.09 P.M.

I beg to enclose sketches giving a faint idea of a portion of the phenomena described above.

Very respectfully, your obedient servant,

GEO. E. BELKNAP,
Captain U. S. N., Commanding.

[On the evening of June 29, 1860, when encamped at the mouth of the Red River, on the southern shore of Lake Winnipeg, the astronomical party, sent that year by the Nautical almanac office to observe, July 18, on the

Saskatchewan, the eclipse of the sun, saw a meteor flash in the northern sky, the trail of which remained visible near the horizon for about three-quarters of an hour, taking on a form somewhat resembling the later ones depicted by Captain Belknap, and in that time changing its position considerably, both relative and absolute.]

THE TYPHOON AT MANILA, PHILIPPINE ISLANDS, OCT. 20, 1882.

THE accompanying diagram gives an abstract of the curves traced by the meteorological instruments at the observatory in Manila, Philippine Islands, during the typhoon which swept over the central provinces of Luzon, Oct. 20, 1882, from the time when the first indications were noticed at the south-east of Manila, at noon of the 19th. The observers were the Jesuit Fathers under Padre Faura, and the instruments those once used by Father Secchi at Rome. Observations made at the marine and telegraph offices in the city, and on the national war vessels on the coast, are incorporated in the diagram.

Barometer. — The mercury descended at noon of the 19th to 756 mm. (about 29½); varying little till near midnight (19–20th), when it began to go down more rapidly. It has been noticed, that, when it descends to this point in the Philippine Archipelago, it always indicates a storm at a considerable distance. Up to dark there had not been observed the cirrostratus clouds, nor the solar halos, nor the characteristic sunset colors, which usually indicate the proximity and direction of approach of a typhoon. There remained only the direction of the superficial winds oscillating from north-east to north-west (of little value), and the course of the clouds, which, till 1 A.M. of the 20th, came from the north-east. At 3 P.M. of the 19th, warning was given from the observatory, 'Signs of a cyclone at the south-east;' but there were no unusual barometric changes. It was at this time more than 370 miles away, with a destructive diameter of about 80 or 90 miles.

From 10 P.M. of the 19th to 4 A.M. of the 20th, the barometer went down more than .15 of an inch: at this time warnings were sent to all the public offices that danger was imminent, and word was telegraphed to Hong Kong that a typhoon was beginning at the east of Manila, and was proceeding west-north-west. At midnight it began to fall more rapidly till 8 A.M. of the 20th; and then, in two hours, fell from 746 mm. (29) to 728 mm. (28.4). About noon it began to rise as rapidly till 2 P.M., and then gradually to 756 mm. (29½) at 10 P.M.

Thermometer. — At noon of the 19th it stood at 32° C. (89½° F.); it gradually went down to 24° C. (75° F.) at 7 P.M.; it remained at this point till about 11 A.M. of the 20th, and then in less than an hour went up to 31° C. (88° F.), and descended again to 24° C. (75° F.), at 10 P.M. standing at 26° C. (79° F.).

Moisture of Air. — It occurred toward the end of the rainy season, and during the south-west monsoon. At noon of the 19th it was 65, rapidly rising between 2 and 6 P.M. to 90, and varying from that to 95 till 10 A.M. of the 20th; at 10.30 it was 100; then in half an hour it went down to 55, and back again to 100, thence gradually declining to 90–95 at 10 P.M.

Velocity of Wind. — There was comparative stillness till 6.30 P.M. of the 19th; from then to 4 A.M. of the 20th it rarely exceeded 20 feet per second; then in three hours it rose to 63 feet, and, after a half-hour's descent to 40, in 1½ hours, or at 11 A.M., reached at least 180, and probably more, as at the height of the gale the registering instrument was carried away: this is equivalent to about 125 miles an hour, and the velocity may have attained 140 miles. In an hour it began to diminish rapidly, and at 1.30 P.M. had gone down to 33 feet, and to 13 at 10 P.M. After several sudden changes, at 2 A.M. it began to blow from the north-west, and so continued till about noon, when it shifted suddenly to the south-west for half an hour, and then blew from south-south-east and east-south-east up to 10 P.M.

Rain. — Rain began to fall just before midnight, 19–20th, and increased, with occasional lulls, to about 11 A.M., when it fell in torrents; after that it gradually decreased, and ceased about 8 P.M. It was accompanied by some lightning.

Direction. — The storm entered the archipelago over the Catanduanes Islands, near Tabaco and Albay, and went across the east of the North Camarines, near Daet, judging from the successive positions of the vortex, then passing over Manila and to the China Sea, by Subig. The course was therefore from south-east to north-west, and its velocity 19 miles an hour, the greatest ever known here.

Form. — The barometer went down much more slowly than it ascended; whence it may be deduced that the curves of equal pressure were not circular, being wider at the anterior than at the posterior part of the typhoon, forming a kind of ellipse, in which one of the foci occupied the vortex. The tracing of the